

Skin Friction and Pressure Measurements in Supersonic Inlets, Phase I

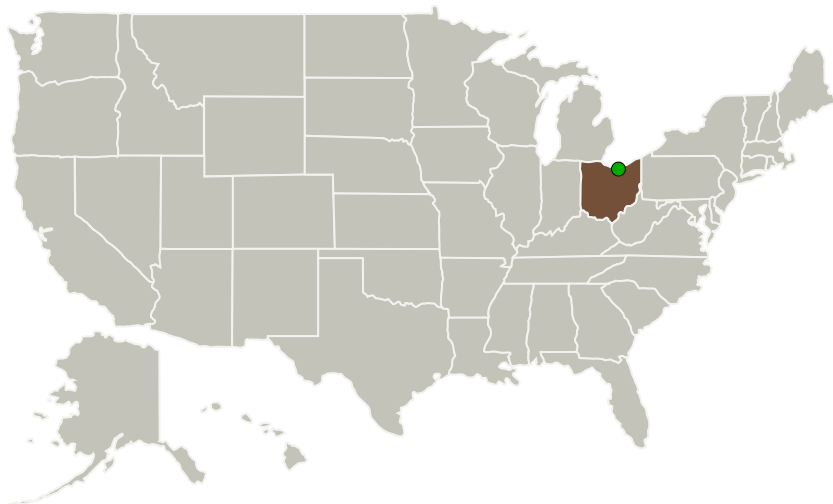
Completed Technology Project (2012 - 2012)



Project Introduction

Supersonic propulsion systems include internal ducts, and therefore, the flow often includes shock waves, shear layers, vortices, and separated flows. Passive flow control devices such as micro-vortex generators and micro-ramps have been proposed to improve vehicle performance. The ability to measure surface quantities such as skin friction and unsteady pressure on the inlet model would provide insight into the complex flow characteristics that govern inlet performance. Unfortunately, nonintrusive sensors require optical access that has been difficult to obtain. Optical sensors for measurements of pressure (Fast Pressure-Sensitive Paint) and skin friction (Surface Stress Sensitive Films) offer non-intrusive measurements on surfaces, exactly the capability that is needed. To date, the size of the hardware such as camera and illumination devices have precluded application of these technologies in regions like an internal duct. During the past several years, camera and LED technology has advanced resulting in small packages for both imaging and illumination. Combining this new hardware with state-of-the-art optical technology such as fast responding PSP and S3F will result in a pair of sensors that can be miniaturized and utilized for non-intrusive measurements in traditionally inaccessible regions of the model. These measurements include continuous distributions of skin friction and unsteady pressure.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Innovative Scientific Solutions, Inc.	Lead Organization	Industry	Dayton, Ohio
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Ohio

Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138507>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Innovative Scientific Solutions, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

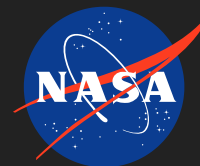
Jim Crafton

Co-Investigator:

James Crafton

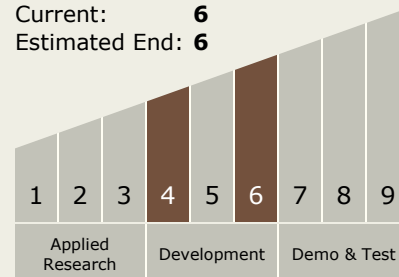
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Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - TX15.1 Aerosciences
 - TX15.1.1 Aerodynamics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System